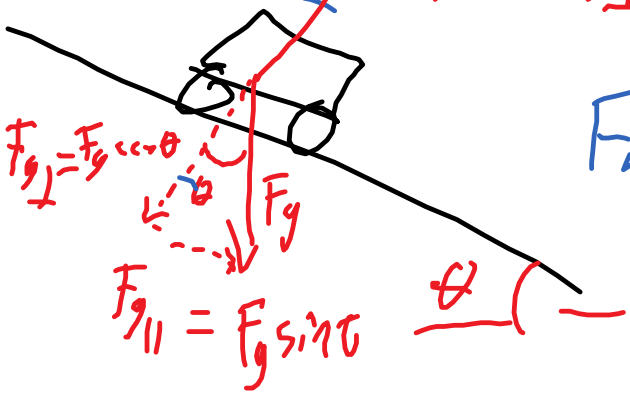
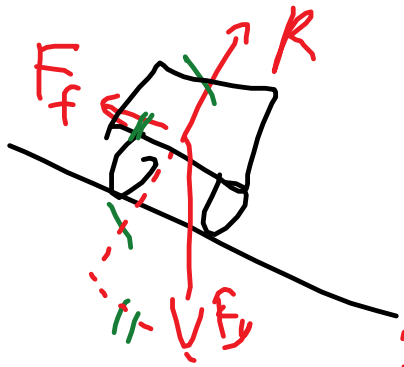
A 2.00 kg cart is on a 35.0º slope. Determine the acceleration of the cart if

a) it is frictionless



b) the friction in the wheels corresponds to a coefficient of 0.30.

assume: initial velocity is zero or down the slope



$F_f = \mu R$

$= \mu mg\cos\theta$

$F_{net} = mg\sin\theta - \mu mg\cos\theta$

$F_{net} = F_{g\parallel} - F_f$

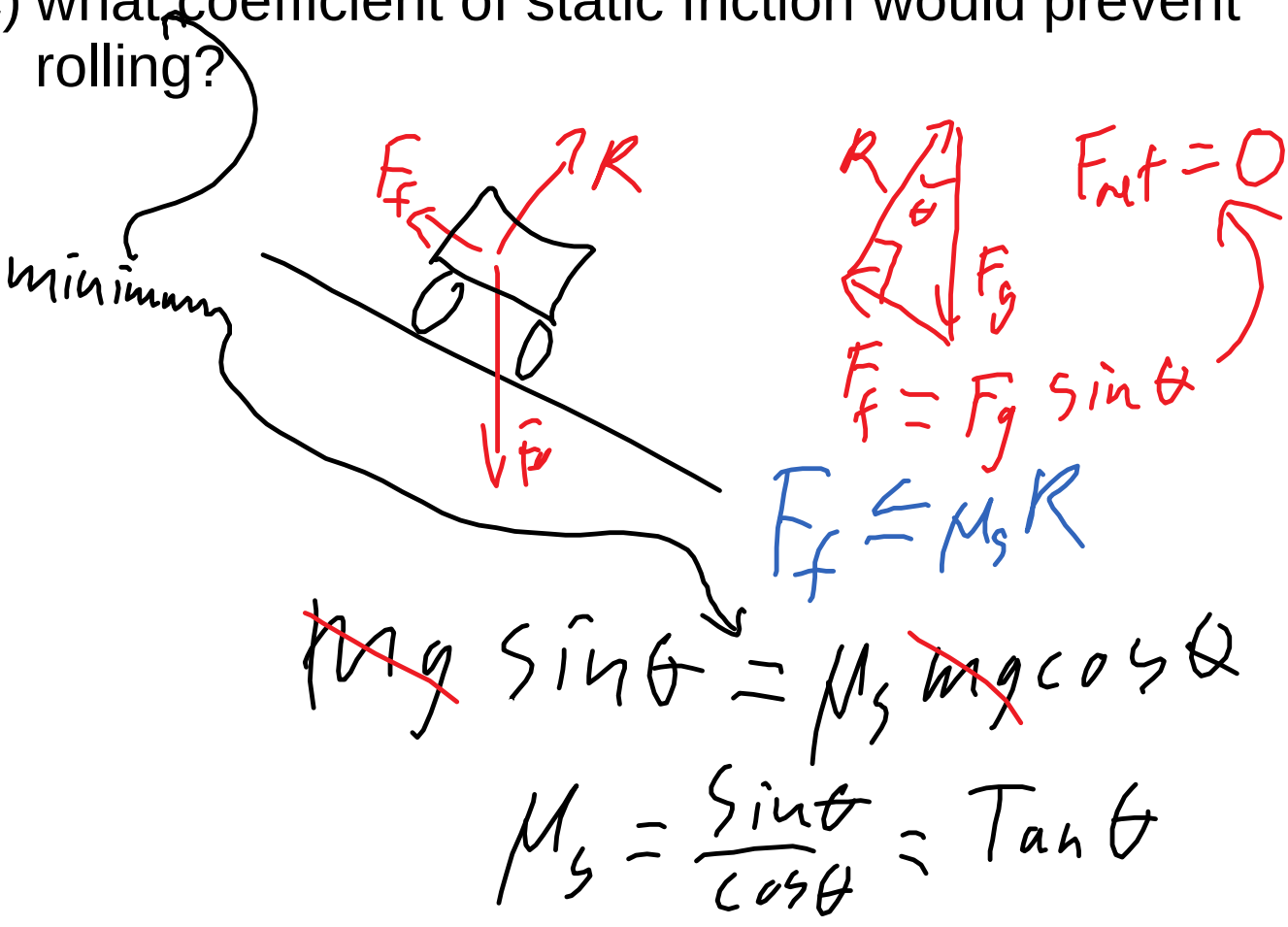
$F_{net} = mg\sin\theta - \mu mg\cos\theta$

$ma = mg\sin\theta - \mu mg\cos\theta$

$a = g\sin\theta - \mu g\cos\theta$

a = 9.81x(Sin(35)-(0.30xCos(35)))=
3.216020374261259
$a = 3.2\ m/s^2$ down the slope

c) what coefficient of static friction would prevent rolling?



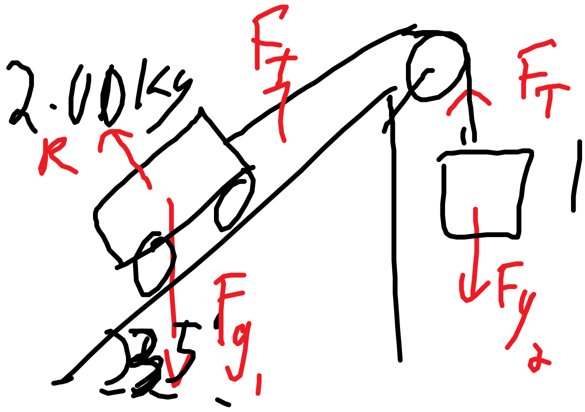
μ_s = Tan(35)=0.700207538209 71
the minimum coefficient is 0.700

d) the 2.00kg cart is connected by a string up the slope over a pulley to a 1.00 kg mass hanging off

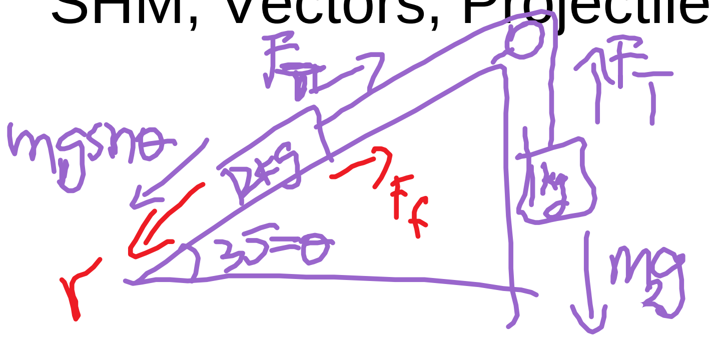
the table. Answer a,b,and c again.

15 minutes

a, F_T



Reminder: test next week, Oct 24th
SHM, Vectors, Projectiles, Dynamics



$F_1 = m_1 g\sin\theta - F_T$

$F_2 = F_T - m_2 g$

$F_1 + F_2 = m_1 g\sin\theta - m_2 g$

$m_1 a + m_2 a = m_1 g\sin\theta - m_2 g$

$a(m_1 + m_2) = g(m_1\sin\theta - m_2)$

Plug in

$$a = \frac{g(m_1\sin\theta - m_2)}{(m_1 + m_2)}$$

$a = 0.48\ m/s^2$

F_f/g

D) $a = g(m_1\sin\theta - \mu m_1\cos\theta - m_2)$

b) $a = g\left(\frac{m_1 \sin\theta - (\mu m_1 \cos\theta + m_2)}{m_1 + m_2}\right)$

$= 0$ too much friction

$F_{y\parallel} =$ 2x9.81xSin(35)=
11.25356968120752

hanging mass, Fg = 9.81N
difference = 11.25-9.81=1.44 N

Friction = 2x9.81x0.3xCos(35)=
4.821528932685006 N
greater than the net force in part a)

d) $F_f = F_{net}$ from part a
μ(2x9.81xCos(35)) = 1.44

μ = 1.44/(2x9.81xCos(35))=
0.089598134954969 2

minimum coefficient friction is 0.0896

Add p96 Q49-52 on homework
Q63 Bonus

Reminder, Test Oct 24th